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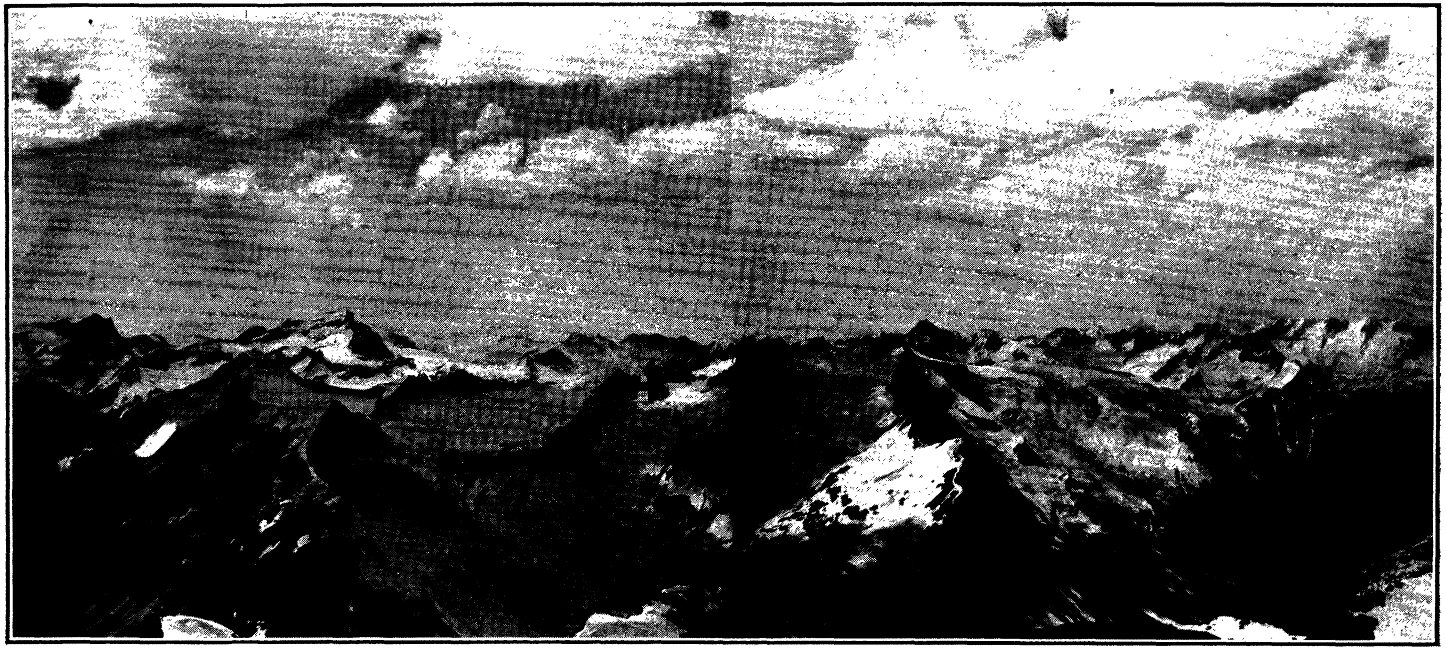

FIG. 1—Nameless Peaks of the Northern Selkirks. Valley of the north fork of Gold Stream on the left, valley of Windy River on the right. The main Selkirk Divide follows the ridge in the right foreground. View looking west from above Silvertip Pass.

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NOTES ON THE EXPLORATION AND THE GEOGRAPHY OF THE NORTHERN SELKIRKS, BRITISH COLUMBIA

BY

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(Map facing p. 256.)

That the territory occupied by the northern portion of the Selkirk Mountains has so long remained unexplored from the standpoint of geographical science is a rather striking illustration of the influence which topography exerts upon the trend of human activity. Entirely surrounded by well-defined routes of travel—the Canadian Pacific Railway on the south and the Columbia River sweeping through its "Big Bend" on the northeast and west—the tract has offered slight inducement to exploration for additional channels of communication, while to nearly all save trappers and prospectors its steep mountain walls and forest-choked valleys have proved disheartening barriers.

It is the purpose of the present paper to outline the more important of the earlier explorations that have thrown light upon this area and then to set forth briefly certain data concerning its internal topography noted by the writer in the course of several recent journeys.

I. Early Explorations

Prior to the construction of the Canadian Pacific Railway what little east-and-west traffic existed across this portion of British Columbia was carried on by the agents of the great fur companies* and followed the obvious route around the northerly end of the range afforded by the valley of the Columbia River. That this involved a detour of about one hundred and fifty miles from a direct line was not a serious objection when the way was comparatively clear and free from untoward hardship. It was not until the commencement of systematic exploratory surveys for a railroad to connect the Crown Colony of British Columbia with the rest of the Dominion that serious efforts were made to find a straighter path across the mountains.

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* "The Dominion at the West" by A. C. Anderson, Victoria, 1872, p. 1.

Probably the earliest attempt of this nature was that undertaken by Walter Moberly, C.E., in 1865. In the course of a march easterly from Shuswap Lake, having discovered Eagle Pass through the Gold Range, he pushed on in the same direction up the Illecillewaet River on the opposite side of the Columbia to the forks of the stream. Here the refusal of his Indians to complete the crossing of the range even if a pass were found at the head of the easterly branch as he thought probable, made it useless for him to continue thither, and the northerly branch was entered instead. This failed to furnish the desired pass, so he returned to his starting point forthwith. Before leaving the Columbia, Moberly had detailed an assistant to proceed up that river to investigate the possibilities for a pass at the headwaters of Gold Stream, an important easterly (left) tributary, but this attempt was also unsuccessful. Both expeditions reported that "the valleys in places are very narrow and the mountains on both sides steep and subject to heavy snowslides."*

Before passing to the later operations of the railroad surveys, we may pause for a moment to refer to the discovery of gold along the easterly tributaries of this portion of the Columbia in 1864-5, which gave the section a wide prominence and resulted in a certain opening-up of what had previously been an unknown wilderness. A rush of prospectors at once set in, particularly from the Cariboo district across the Gold Range, and a scene of considerable excitement ensued. Log towns were built, mines were opened, and in the course of several years as much as $300,000 worth of gold was produced, but owing to the remoteness and resulting difficulty in bringing in sufficient supplies the diggings were finally abandoned. The principal placers were located along the bottom lands of Gold Stream, Downie Creek, Carnes Creek and their branches.† One might naturally suppose that the vicinity would have been scoured far and

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*"Report to Surveyor General of British Columbia" by Walter Moberly, C.E., *British Columbia Gazette*, December 23, 1865. This is accessible in the Provincial Secretary's office, Victoria, B. C.

† For an account of a trip into this region twenty years later (1885) see "The Canadian Rockies: New and Old Trails" by A. P. Coleman, New York and London, 1911, pp. 60-78.

wide by these adventurers, but such does not seem to have been the case owing to the extremely difficult nature of the country.*

In 1866 Moberly extended his explorations to include the easterly borders of the Selkirks by a traverse of the Kootenay valley and of the Columbia valley from the headwaters of that river to the Big Bend. He was thus in the best possible position to grapple with the baffling enigma of a suitable location for the railway across the range, when in 1871 he was appointed district engineer of this section. During the winter of this year he accomplished the first known crossing of the chain. Proceeding on snow-shoes down the Columbia River from a point near the mouth of the Blaeberry on the easterly side of the Selkirks, the party turned up Gold River† and followed it to the headwaters. There they discovered a high pass during the passage of which they were "nearly buried beneath an immense avalanche that came roaring down the steep mountainside when we [they] were near the summit." Continuing westward "after a very fatiguing journey" they reached the nearly deserted mining town on French Creek presumably via the valley of Gold Stream.‡ The expedition thus meagerly described seems to mark the end of Mr. Moberly's work in the range. He was undoubtedly the first to acquire a comprehensive knowledge of its topography, which few, if any, subsequent travelers, even present residents of the province, have equaled. The difficulties and dangers involved in such pioneer work among these savage mountains can scarcely be appreciated short of personal experience, and it is well within the truth to state that lesser accomplishments in the world of exploration have received wider recognition.

Owing to various circumstances which do not concern our present purpose the attack on the Selkirk problem was allowed to lapse during the next few years. Its final solution was not officially achieved until 1881, when Major A. B. Rogers, retraversing Moberly's line of march of 1865 up the Illecillewaet River to the forks and continuing thence along the easterly branch, reached the long-sought pass, now well known as Rogers Pass, exactly as predicted by Moberly at that time.§ An instructive illustration of the nature of the obstacle presented by the Selkirk chain is found in the fact that the adoption of this route, the last link in the line, occurred only three years before the passage of the first transcontinental train in November, 1885, when the location had been perfected across the loftier main Rocky Mountain range and the road was in operation as far west as Calgary.

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* "Mineral Wealth of British Columbia" by George M. Dawson, *Annual Report of the Geological Survey of Canada*, Vol. III, 1887-88, p. 40 R.

† Gold *River*, a left affluent of the northwest-flowing portion of the Columbia, into which it empties in 51° 43′ N., should not be confused with Gold *Stream*, just referred to, a left affluent of its south-southeast-flowing portion which it joins in 51° 40′ N. With regard to the terminology cf. *Geogr. Journ.*, Vol. 37, 1911, pp. 178-179. ASST. EDITOR.

‡ These extracts are quoted from a pamphlet by Mr. Moberly entitled "Early History of C. P. R. Road," pp. 8 ff., to which the writer is indebted for many other facts as well. See also his "The Rocks and Rivers of British Columbia," with map and illustrations, 1885.

§ It is stated in the pamphlet referred to that Albert Perry, an assistant of Moberly, reached this pass in 1866 by way of the Illecillewaet valley.

The selection of this route naturally removed the incentive for systematic exploration to the north, and the further efforts made were confined to the development of its immediate vicinity. Accordingly it has resulted that the interior of the tract under consideration has remained essentially in its primeval obscurity undisturbed by the passage of nearly a century's travel around it via railroad and river. It is unmapped in detail, and, save for the principal streams, its features are for the most part nameless.

II. Recent Explorations[*]

Passing now to the latest work among the northern Selkirks, allusion may be made to the expeditions of P. A. Carson, Dominion Land Surveyor, in connection with the governmental triangulation of the "Railway Belt." In 1906 and 1907 he pushed northwesterly from the railroad and extended the mapped territory to include the North Fork of the Illecillewaet River and most of Gold River. The work was in the nature of a reconnaissance to select suitable stations for the triangulation, and, accordingly, the reports[†] as far as they refer to the topography of this section are mainly of a general character, though they afford valuable information within their scope.[‡]

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[*] Under this heading it is appropriate to include the subjoined note by the Assistant Editor, though when the following portion of the paper was written it was not intended to do more than to present, besides the writer's narrative, the salient results of the government surveys with respect to the interior geography of the Big Bend region. All reference to other and presumably less important exploratory work in the Columbia Valley, along the railroad, or in territory immediately contiguous to them, is forbidden by limitations of space. Consideration of this work is deferred to a subsequent paper. With respect to the ascent of Surprise Mount referred to below, it will be of interest to alpinists to note that the trip is probably the first recorded ascent in the northern Selkirks.

NOTE.—Mention should here be made of Professor A. P. Coleman's explorations in this region. In 1888, in the first of his attempts to reach Mts. Brown and Hooker, which finally resulted in establishing the falsity of the extreme altitudes with which they had been credited, he made a journey by canoe and raft from Beavermouth down the Columbia, past Surprise Rapids (below the mouth of Gold River) to Kinbasket Lake, whence he was forced to return because of insufficient provisions. On this journey he ascended a mountain on the left bank of the Columbia overlooking the rapids, which he named Surprise Mount. It is probably not far from the "Mt. Stockmer" of Mr. Palmer (*Geogr. Journ.*, Vol. 37, 1911, p. 172). References to Professor Coleman's journey will be found in Part III of the book referred to in the note on p. 242 and in his paper, "Notes on the Geography and Geology of the Big Bend of the Columbia," *Proc. and Trans. of the Royal Soc. of Canada for . . . 1889*, Vol. 7, 1890, Section IV, pp. 97-108. ASST. EDITOR.

[†] See *Annual Reports of the Topographical Surveys Branch* covering the years 1906, 1907, 1908, and 1909, Appendices 17, 18, 18 and 13 respectively, by P. A. Carson, D. L. S., with maps.

[‡] In 1902, during the course of a survey of the mountains along the railroad for the Dominion government, Arthur O. Wheeler, D. L. S., determined the altitudes of two important mountains well within the region under discussion: Mt. Sir Sandford, 11,634 feet, and Mt. Iconoclast, 10,618 feet. Vide his Selkirk Range," Vol. I, pp. 74-75.

The first ascents of Mt. Sorcerer and of a peak situated between the south and the main branch of Gold River called Mt. Sonata (*ca.* 9,800 ft.) are worthy of mention, for both expeditions must have been arduous for men cumbered with surveying instruments and accessories.

During the summer of 1911 the writer, in company with Professors E. W. D. Holway and Frederic K. Butters of the University of Minnesota, made two journeys into the heart of the Selkirks north of the railroad. Our objects were largely those of the mountaineer, but at the same time we planned to adopt such routes and ascend such peaks as would throw all possible light upon the topography both within and beyond the limits previously covered. In particular we desired to trace the water-parting of the range which forms the boundary between the districts of East and West Kootenay,* to locate the passes and generally to untangle as far as we could the exceedingly complicated drainage system. In addition we counted on carrying out a rough survey with transit and camera along with certain glacial, botanical and other scientific observations. The following paragraphs present a brief description of some of the salient orographical features observed.

Our first expedition, starting from Beavermouth in June, descended the Columbia by canoe and turned up Gold River, its first large westerly tributary, as Moberly had done in 1871. We pushed to the limit of navigation by boat and then continued with pack harness. Leaving the main valley for that of the west branch of the river, a base camp was finally established at its source near Sir Sandford Glacier on June 14, where the party made its headquarters for the following five weeks. Supplies were relayed in by two porters.†

For three weeks nearly continuous rain kept us under canvas, but then the storm cleared and with favorable weather we made a week's trip to a valley lying to the southwest beyond the basin of Sir Sandford Glacier about five miles away. From here we ascended an isolated peak (9,400 feet),‡ some three miles further off, commanding the westerly side of the range. This formed an important station, for being situated in the point of the V between the northerly and easterly branches of Gold Stream, it covered these and a considerable reach of the river below the forks as well. Goldstream Mount is suggested as an appropriate name.

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* *Report of Minister of Mines for British Columbia*, 1899, p. 570.

† Detailed reference to this vicinity is omitted since information is already available. See the writer's "A Pioneer Reconnaissance in the Northern Selkirks," *Appalachia*, Vol. 12, No. 1, July, 1909, pp. 16-30, and "Explorations about Mount Sir Sandford, British Columbia," *Geogr. Journ.*, Vol. XXXVII, 1911, pp. 170-179.

‡ The heights mentioned in this paper are estimates based on aneroid readings unless the context indicates otherwise.

To the west, numerous sharp, well-timbered ridges, seldom reaching far above snow-line, succeeded each other in a diminishing series towards the broad valley occupied by the Columbia. Further off along its western bank the Gold Range with its long array of snowy summits was plainly in view stretching far to the north and south.

Northwesterly, the continuation of the Selkirks presented a characteristic complex of sharp, glacier-bearing summits (Fig. 1), varying chiefly in a lessened altitude from the more familiar portions of the chain. At two points, however, elevations of not less than 10,000 feet stood out, one a knot of four peaks since plotted as situated between the headwaters of Big Mouth and French Creeks, for which the name Mt. Dentiform is suggested, the other apparently forming a long even-crested wall along the westerly bank of Windy River. Immediately at our feet on this side flowed the north fork of Gold Stream, taking its source in part from the westerly glaciers of the

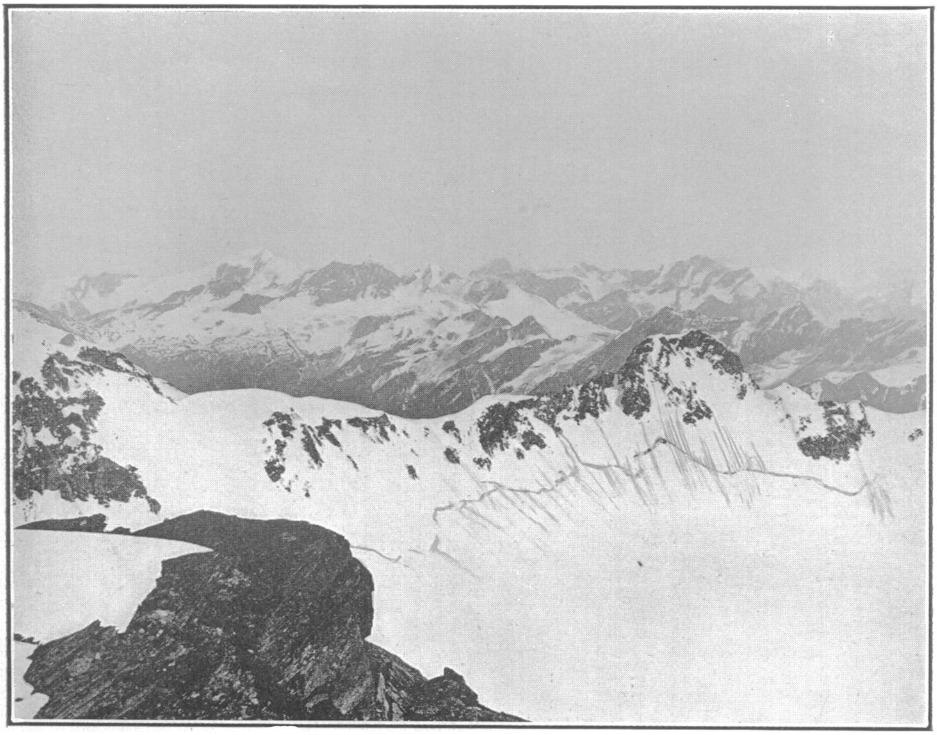

FIG. 2—View south from Gold Stream Mt. showing Mt. Sorcerer on the left and Mt. Holway on the right about 15 miles away across the valley of Gold Stream.

Austerity group. Below these, a narrow pass cut through to what we saw later was a north-trending valley, a branch of Windy River just mentioned. Thus the divide was determined at this point. It is worthy of note that here it approaches within seven miles of the Columbia giving a disproportionately long westerly slope to the range. Towering over all, the relentless peaks of the Austerity group presented an impressive ensemble of chocolate-hued cliffs and pinnacles.

Northeasterly in the direction whence we had come the snowy scene was entirely monopolized by Sir Sandford and his attendant satellites. Easterly in the distance we looked through a pass at the head of one branch of the east fork of Gold Stream, and we at once selected this as the objective of our next excursion, since it occupied the most probable position for the pass by which Moberly had made the first crossing of the mountains as above described. Turning to the southeast and south (Fig. 2), the range continued in a hopeless maze of snowfields and glacier-scarred peaks, among which we recognized Mts. Iconoclast and Sorcerer. A few miles to the west of the latter, a throng of striking summits claimed our admiration, out-topping everything in their immediate vicinity. It was apparent that from any of these the view towards us would be most instructive topographically. Westerly again came the forested ridges extending towards the Columbia, drained in this quarter by Downie Creek. The remarkably long ridge dividing the basins of Downie Creek and Gold Stream culminated in a handsome, sharp, rocky spire which soared above these valleys from the midst of a complicated group of lesser mountains. It is designated on the accompanying map as Mt. Arrowhead, and appeared to be not far from 10,000 feet high. The valley of Gold Stream in this direction is heavily timbered, and the river wanders in intricate meanders among swamps and beaver meadows.

From our camp the following day, we made our way across a snowy pass and a smooth névé, descending over its easterly effluent to the supposed Moberly Pass. From the edge of the névé we saw that it was a long, sparsely timbered saddle to which open meadows and rushing streams, fed by many melting snow-banks among the evergreens, gave a pleasant park-like appearance. As we descended the glacier, the questions arose: Which way does the drainage from the southerly tongue of Sir Sandford Glacier run? Is Citadel Mountain on the divide or not? Our interest and expectancy were keen as we followed the stream downwards along its cascade. Not till we reached the pass itself was the matter clear (Fig. 3). There we saw that the stream curved abruptly to the east forming the source of Gold River and placing Citadel, Sir Sandford and Sir Sandford Glacier on that side of the divide. We were slightly below the actual water-parting and soon hastened up a rivulet to locate the very place. This we found about a quarter of a mile beyond (alt. 5,900 feet) where another glacial brook ran down onto the pass from the same side and then swung sharply west. In this direction the valley dropped away abruptly and the stream cascaded. From the high névé that we had crossed earlier in the day a glacier descended tumbling apparently out of the sky and breaking over a cliff in a magnificent ice-fall for more than 1,600 feet. At the bottom, the stream was reconstructed in two tongues on either side of a rocky cleaver. The whole formed one of the finest and most instructive examples of glacial activity to be found in the range.

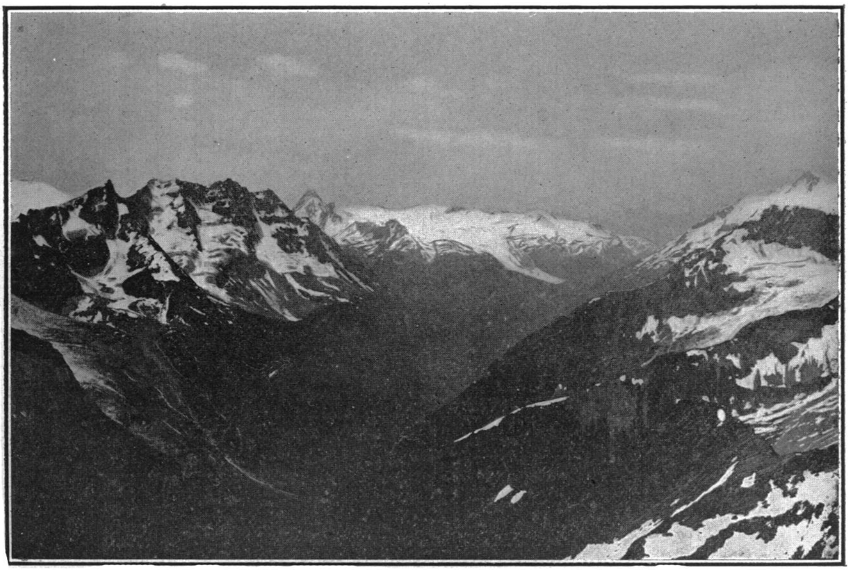

Fig. 3—View west up the main branch of Gold River. Mt. Citadel at the right 8 miles distant; Moberly Pass at the head of the valley.

After carefully studying our surroundings, we felt no doubt but that this was Moberly Pass. It was the most direct route connecting any of the branches of Gold River and of Gold Stream below timberline, and, as Moberly had reported, it appeared obvious that a tunnel would have been necessary for a railroad following this route across the range owing to the steepness of the westerly approach. The pass was similar to Rogers Pass in size and extent, though without as many lofty peaks in view about it. Mt. Sir Sandford was concealed by the ice-fall in that direction. A buttress of Mount Citadel (9,580 feet) and a nameless peak of about the same height to the southeast were the most prominent mountains in the prospect. On the south side extensive névés occupy a higher plateau from which several tongues protrude and all but reach the pass. Only the largest of these, however, is visible from below. It is a rather significant fact that all the branches of Gold Stream and of Gold River correspond almost exactly at the various passes without any interlacing of their courses.

Shadows falling on the pass warned us to curtail further investigations, attractive though they would have been, for a whole range intervened between us and our evening meal. Accordingly, about four o'clock we struck upwards through the woods to regain our morning's route. We climbed into the sunshine an hour or two later, which, suffusing the entourage of glacier and peak with a golden radiance, brought out a picture of surpassing loveliness.

Returning to Sandford camp, the only further trip from this point that need be referred to in detail (though each of the other six climbs to above 9,000 feet yielded either new or confirmatory information of value) is the first ascent of Mt. Austerity accomplished by the party on July 20. This mountain is situated five miles to the north-northwest of the camp and was triangulated at 10,987 feet, giving it a rank of some importance among the loftiest summits of the range.* It commands an unsurpassed outlook to the north and west across the Columbia valley. Wide snow fields, divided into three or more gathering basins by off-shoots of the range towards the river, send down dissipators in this direction. The cluster of summits to which Mt. Austerity belongs is composed entirely of primitive granite, while Mount Sir Sandford, a half dozen miles to the southeast and of greater elevation, is a solid mass of crystalline limestone. This curious juxtaposition of structural extremes presents a problem of considerable geological interest.

These excursions resulted in the determination of the main divide of the range for about eight miles. Numerous photographs had been secured from various points fixed by instrumental triangulation which would furnish a basis for a topographical map of the vicinity. Regaining the railroad at Donald by way of the government trail along the easterly bank of the Columbia, we at once set about preparations for another visit to this splendid alpine region.

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*The average height of twenty-two peaks which have been triangulated at altitudes of 10,500 feet and over is 10,800 feet. The height mentioned for Mt. Austerity depends upon the value 11,634 accorded Mt. Sir Sandford by Wheeler's survey.

Our second expedition, setting out from Albert Canyon August 10, struck inland by way of the valley of the North Fork of the Illecillewaet River in order if possible to reach the peaks noted from Goldstream Mount from this side. Though Carson's reports previously referred to describe a road to the head of this valley, locally no reliable information could be obtained as to its condition or the character of the mountains thus accessible. Accordingly, as the bridges and trail might turn out to be impassable for horses, we employed our former porters and succeeded in reaching the pass at the head of the North Fork (Illecillewaet Pass) on the evening of the second day without encountering any obstacles more serious than those offered by our packs. Camp was established here for the ensuing week (August 12-19).

The North Fork valley presents some points of contrast to the ordinary valleys of the range, and for this reason a somewhat detailed reference to it may be warranted. Most commonly Selkirk valleys exhibit the sharpest possible contrasts between heights and depths. Their walls, frequently sheer cliffs, plunge down directly to the streams below. Profiles are sharp and bold with rounded forms in the minority. The valley in question, however, though gorge-like near its mouth, opens out after some miles rather widely. The mountains retreat on the east and stretch out to the north and south in a long ridge of alpine meadow-land seldom cut by passes below timber-line. This serves as a base from which the separate massifs rise, with wide gaps between, to perhaps 9,000 feet. There are only four or five of these mountains between Corbin Peak that overlooks the railroad at the southerly end and Mt. Sorcerer. They are all rather subdued in contour and bear comparatively little perpetual snow and ice on their westerly sides.

Of quite a different aspect is the range to the west. Though, from the valley, nearer spurs screen the higher summits for the most part, occasional fleeting vistas up tributary creeks disclose fine bold crags and lofty walls set among snow-fields and glaciers, some of which are about 10,000 feet high. About a dozen miles above the mouth these form quite an impressive display. At this point the valley bottom expands into meadows rankly overgrown with tall grass and weeds where the river relaxes somewhat from its usual headlong course.

These characteristics suggest to the wayfarer that possibly this valley formed a kind of eddy in some remote disturbance which increased the elevation of the range to the west without affecting its easterly wall to the same degree. Near the mouth of the valley at

Albert Canyon, Archean rock is disclosed.* For the upper five miles below Illecillewaet Pass, the valley wall on the west consists largely of dark gray limestone which crosses to the east in the vicinity of the pass and continues along this side to the north. From Mt. Sorcerer southerly the easterly wall appears to consist of a reddish brown quartzite. The river, in consequence of getting most of its supply from the west, has a dirty, black appearance in time of flood. From our camp on the pass many violent contortions in the strata and numerous faults were noted.

Illecillewaet Pass has an altitude of about 5,900 feet with scarcely a vestige of timber. The slopes thereabouts are grass covered and unusually bare of alders. To the west, a thousand feet above the pass, there is a small snow-field which sends down two tongues from the ends of which streams flow in opposite directions to Illecillewaet River and Downie Creek respectively. The latter valley continues the direction of the former to the north, and from Corbin Peak it should be possible to obtain an unobstructed view directly up this trough for thirty miles.

From our camp at Illecillewaet Pass we made the first ascent of Mt. Holway (Fig. 4) situated about five miles to the west of the pass, and affording by its elevation of something over 10,100 feet an unequaled outlook. We found with some satisfaction that this mountain belonged to the group of prominent peaks which we had noticed from Goldstream Mount, and in fact occupied an advantageous position in their midst. To the west we looked down into what is probably the chief source of Downie Creek. It is an exceedingly deep basin surrounded by precipitous walls, above which to the south lies a wide snow-field, culminating in a low dome some eight miles from our belvedere. The dome is cut off from the range forming the western wall of the basin by a narrow timber-line pass which is presumed to connect with Carnes Creek. Continuing northerly, the range attains an altitude almost equal to that of Mt. Holway in a lofty scallop-crested wall from which one large and numerous small glaciers stream valleywards in beautiful ice cascades. Glistening in the afternoon sunlight with fleecy clouds drifting lazily overhead, the range presented a serene alpine picture, and Serenity it has since been named. Mt. Serenity is suggested for the most prominent summit dominating the trunk glacier. Northwesterly were the depressions of the lower courses of Downie Creek and Gold Stream where the mountains did not in many cases surpass the snow-line. Topographically the most striking feature in this vicinity is the Arrowhead group, mentioned above, which separates these streams. It was seen to be connected with the water-parting of the range by a winding, serrated wall some fourteen miles long, pierced in several places by high passes. At the point where the branch of Downie Creek descending from the pass makes its sharp turn to the west, this wall parts their streams by less than four miles. In this direction, between the branches of Downie Creek, the Illecillewaet Range continued from our standpoint, rising in two instances to elevations of some prominence.

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* "A Note on the Geological Structure of the Selkirk Range" by Geo. M. Dawson, *Bull. Geol. Soc. of Amer.*, Vol. 2, p. 173.

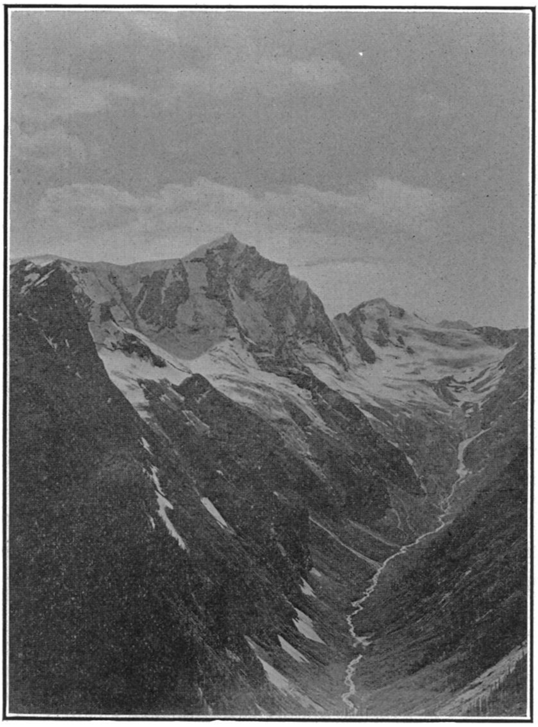

FIG. 4—Mt. Holway seen from the northeast across Downie Creek. The valley in the right foreground is that of a small left tributary of Downie Creek.

The familiar peaks near Mt. Sir Sandford described above were all in view. Swinging easterly and then southerly the panorama embraced the entire known range, all the mountains about Glacier as far south as Mt. Sugarloaf and the Battle Range being readily made out. In its remarkable scope of fully seventy-five miles along the backbone of the Selkirks, the outlook from Mt. Holway can scarcely be equaled save perhaps by that from Mt. Sorcerer nearby. Southerly in the direction whence we had come, the Illecillewaet Range presented an interesting line of jagged summits (Fig. 5). For the highest, a forbidding snowless horn, about six miles distant, the name Mt. Moloch is suggested.

A second excursion from our headquarters to the top of Mt. Sorcerer (10,500 feet) (Fig. 6) east of the pass afforded valuable data on the immediate vicinity, but owing to clouds settling down about the summit just before we arrived it was impossible to make any distant observations. A long even ridge descending towards Mt. Iconoclast separates the basins of Gold River and Mountain Creek, both of which streams have their sources in the glaciers of the mountain. To the north, across the valley of Gold River, we had a good view of the pass leading into the southwesterly branch of Gold Stream. It is a snow-line pass, but without glaciers on either side,

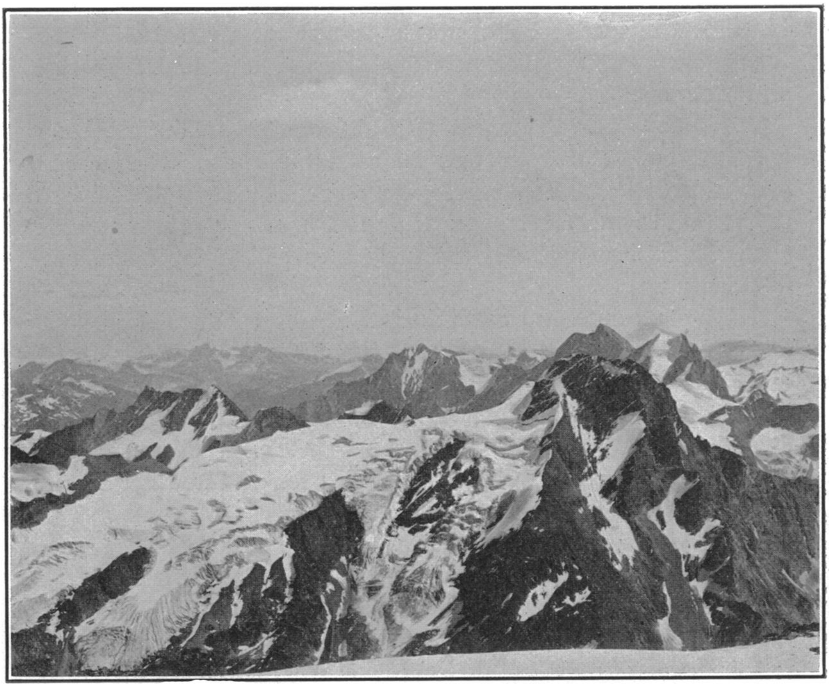

FIG. 5—View southeast from the summit of Mt. Holway along the Illecillewaet Range. Mt. Moloch in the distance at the right, the valley of the North Fork of the Illecillewaet River at the left.

and is probably passable for horses, though the lower approaches were not clearly seen.

After remaining nearly four hours on the summit, we were finally forced to descend amid thick snow flurries and snapping electrical discharges from the rocks. The mountain is the key to the drainage system of the Big Bend region, for within a radius of less than three miles is included the sources of its four longest rivers, Downie Creek, North Fork of the Illecillewaet, Mountain Creek and Gold River, and a short extension would take in that of the fifth, Gold Stream. Both Mt. Sorcerer and Mt. Holway furnish most valuable stations for the surveyor, the latter, perhaps, being the easier to occupy with an instrument.

A few days later a visit was made to the grassy saddle connecting the south branch of Gold River with Downie Creek. The aneroid gave its elevation as 6,800 feet, and except for the steep descent into the latter valley it should be practicable for horses. The bottom lands along Gold River appeared unusually open and grassy for a long distance.*

Having accomplished our principal objects by these excursions and the weather being unsettled, we returned to the railway in two days. On the way we halted at the mouth of a tributary valley leading to Mt. Moloch with the intention of exploring a splendid glacial amphitheater of which we caught glimpses through the trees in that direction, but sixteen hours of rain with a falling barometer forced us to abandon the project.

The accompanying map embodies the large topographical results of our trips. Its especial aim is to exhibit the relations between the trunk streams of the northern Selkirks with their chief connecting passes. It has not previously been possible for any one entering and following one of these valleys to know in what portion of the range he would eventually come out, but it is believed that this difficulty will no longer exist owing to the fact that our party was fortunately able to occupy summits along the axis of the range which covered the sources and upper courses of the master streams. Indeed, except for the territory northeasterly from Revelstoke and the very tip of the Big Bend itself, there is little of the region that has not been visible from our stations. The map consists of a reduction from the writer's work founded on an independently measured base fitted into the border of previously mapped country after alteration to a common scale, both being adjusted to a mean agreement on the various overlapping points. The only changes worthy of mention that this process rendered necessary in the previous map occurred in the upper and middle courses of Gold Stream and Downie Creek. As these were apparently largely generalizations, the less hesitancy was felt in altering them to agree with the later observations.

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* NOTE ON THE PASSES. It may be of value to list briefly the principal passes connecting these trunk valleys not already referred to.

Between Mountain Creek and what is probably the south branch of Six Mile Creek a high pass was seen south of Mt. Iconoclast. The approach is steep, though snowless on the side of the former.

Between Mountain Creek and the south branch of Gold River there are two passes, the more northerly being a broad open pass. Both are above snow-line and probably have glaciers on the north.

Between Downie Creek and Gold Stream there is a high pass at the westerly turn of the former. The Gold Stream side supports a small glacier.

Sir Sandford Pass (8,100 feet), west of Mt. Citadel at the head of Sir Sandford Glacier, leads down to Moberly Pass. It is practicable only for mountaineers, as seven miles of glacier must be traversed.

Silvertip Pass (8,400 feet) between the glacier of the same name and the valley of the north fork of Gold Stream is also a glacier pass suitable only for mountaineers, but it is the most direct line across the range in this region.

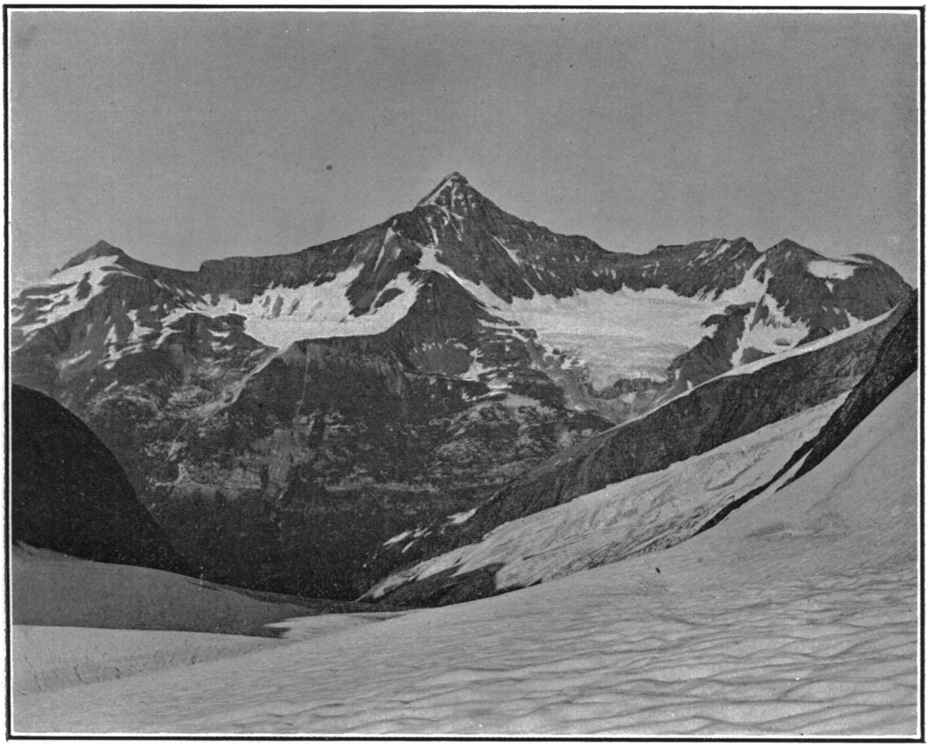


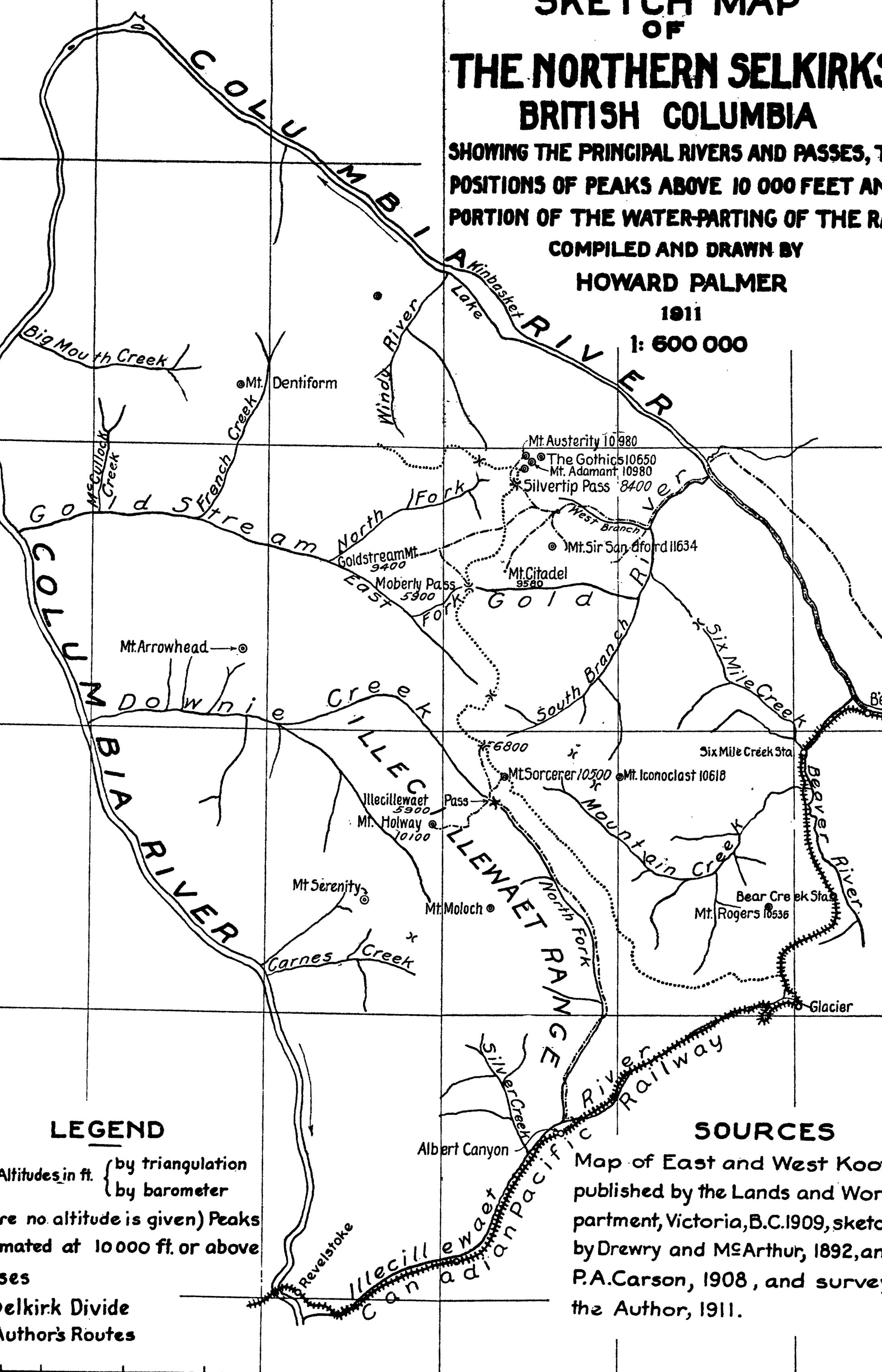
FIG. 6.—Mt. Sorcerer seen from the southwest across the valley of Downie Creek.

III. CONCLUSION

In conclusion, a brief summary of the physiographical characteristics of the Big Bend region may be appropriate. In area it covers about 2,400 square miles, which is entirely occupied by an exceedingly complicated labyrinth of mountainous spurs and ridges that may be considered for present purposes as forming the northerly termination of the Selkirk Range. The greater number of these rise to between 7,500 to 9,000 feet in altitude, but there are many summits ranging between the latter limit and 11,634 feet, the highest measured point. That these figures indicate more than an insignificant relief is evident from the fact that the Columbia, in circling around the range, descends from about 2,400 feet at Beavermouth on the east to nearly 1,400 feet at Revelstoke on the west, so that almost always the visual angle cuts a vertical sweep of 5,000 feet, while one of 6,000 feet is not uncommon and even of 9,000 feet is not unknown.

With a snow-line that may be placed in the neighborhood of 7,500-8,000 feet, and a heavy precipitation, conditions are most favorable for glaciers, and these exist in the greatest profusion in all parts of the range. Examples of every recognized class are to be found with the exception of the continental, and even this is represented in miniature by single bodies of ice aggregating ten square miles in extent.

Below snow-line, the valley slopes are densely forested with spruce, fie, hemlock, yew, cedar, and pine, while in the bottom lands cottonwoods, birches, alders, and poplars are also to be found. These, intermingled with a varied undergrowth of tropical luxuriance and combined with canyons, precipices, falls, and rapids, form a nearly complete category of the obstacles with which prolific nature opposes the explorer. The final items (*caveat viator!*) are the mosquitoes, that flourish up to 6,000 feet, and the precarious weather, with regard to which it has been said with a near approach to truth that every sign means rain.



SKETCH MAP
OF
THE NORTHERN SELKIRKS
BRITISH COLUMBIA
SHOWING THE PRINCIPAL RIVERS AND PASSES, T
POSITIONS OF PEAKS ABOVE 10 000 FEET AN
PORTION OF THE WATER-PARTING OF THE RA
COMPILED AND DRAWN BY
HOWARD PALMER
1911
1: 600 000

LEGEND

Altitudes in ft. { by triangulation
by barometer
re no altitude is given) Peaks
mated at 10 000 ft. or above
ses
elkirk Divide
uthor's Routes

SOURCES

Map of East and West Koo
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by Drewry and McArthur, 1892, an
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the Author, 1911.